TEMPERATURE OF THE NARROWING OF THE NMR LINE AND ITS RELATION TO THE GLASS-TRANSITION TEMPERATURE OF POLYMERS*

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A CONSIDERABLE amount of data have now appeared in regard to the temperature of the NMR line narrowing (T_{nar}) determining the onset of segmental motion in polymers [1]. However, insufficient is known at present about the relationship between T_{nar} and the glass-transition temperature T_g determined by the classical low-frequency methods (dilatometry, dielectric losses with a frequency of 1 c/s, etc.). Our aim in this investigation was to analyse the techniques and peculiarities involved in determination of T_{nar}, and to elucidate the relationship between T_{nar} and T_g. The data discussed here are restricted to those polymers for which both the glass-transition temperatures and the shape of the $\delta=\delta(T)$ curves are already known. The data in question were either in the available literature or in papers by the authors cited in the Tables.

TABLE 1. VALUES OF τ_1 AND τ_2 FOR SOME POLYMERS

Polymer	$-\log \tau_1$	$-\log \tau_2$
Polymethylmethacrylate-1, atactic [5]	4·3	4·0
Polymethylmethacrylate-2, atactic [5]	4·3	3·6
Polymethylmethacrylate-3, isotactic [5]	4·3	3·6
Polymethylmethacrylate-4, isotactic [5]	4·3	4·0
Polymethylmethacrylate-5, isotactic [5]	4·0	3·9
Polyethyleneterephthalate, crystalline	4·4	3·9
Polyamide 6-6 [6]	4·6	4·5
Polyvinylbutyral	4·2	3·8
Polypropylene, atactic [7]	4·6	4·5
PVC	4·7	4·1
Polyvinylacetate	4·5	4·2
Polystyrene, atactic	3·6	3·0

Two methods are generally used to find the temperatures of the rapid NMR line narrowing: 1) T_{nar} is taken to be the temperature at which δ (or its second moment M_2) is reduced by 50% compared with the line width in the absence of segmental motion in a sample [2]; 2) T_{nar} is taken to be the temperature cor-

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